

MR1683-703

Serial Number: 10/62,433

Reply to Office Action dated 12 January 2006

**REMARKS/ARGUMENTS**

This case has been carefully reviewed and analyzed in view of the Office Action dated 12 January 2006. Responsive to the rejections made by the Examiner in the Office Action, Independent Claims 1 and 5 have been amended.

In the Office Action, the Examiner rejected Claims 5-7 under 35 U.S.C. § 102(b) as being anticipated by Glenn et al. (U.S. Patent 6,342,406), and Claims 1-4 and 8-10 as being rejected under 35 U.S.C. § 103(a) as being unpatentable over Glenn et al. in view of Park et al. (U.S. Patent 6,211,461).

Prior to discussing the prior art relied upon, it is beneficial to first briefly describe the Applicant's invention in light of the inventive Claims, the Specification, and the Drawings. The Claims now more clearly recite the unique combination of elements, which provide the invention of the subject Patent Application with many advantages over the prior art. Among the features of the inventive Chip Scale Package Structure, are a chip scale package (CSP) structure (1) for an image sensor with multiple bonding pads (11) formed on the top face of the semi-conductor image sense chip (11), multiple bonding pads formed on a top face of the semi-conductor image sense chip, and a conducting wire (12) extending from each of the multiple bonding pads by wire-bonding. Furthermore, a liquefied gelatinous material covers the top face of the semi-conductor image sense chip and forms a transparent layer after drying up. The transparent layer (13) is a single layer structure which coats the top surface of the sensor chip in a

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continuously contiguous manner for permitting light to pass through. Additionally, the transparent layer has a thickness equal to the height of the conducting wire (12). The fact that the transparent layer coats the top surface of the sensor chip in a continuously contiguous manner is an important aspect of the Applicant's inventive concept. The transparent layer being continuously contiguous to the top of the image sense chip decreases the volume area of the image sensor, making the CSP ultimately smaller. These advantages are clear and discussed in the Specification as filed on page 2, lines 18-22.

It is respectfully submitted that Glenn et al. discloses an image sensor package (100) including an image sensor (102) having an active area (104) and bond pads (106) on a front surface of the image sensor. A window (110) is mounted to the image sensor by flip chip bumps (112) formed between the bond pads of the image sensor and interior traces (114) on the interior surface (110i) of the window. The active area is located within a cavity (132) containing a medium (140).

The Glenn et al. reference fails to show "...a transparent layer continuously contiguous to the top face of the semi-conductor image sense chip, the transparent layer having a thickness being equal to that of each of the bumps for permitting light to pass therethrough," as now defined in amended claim 5. The CSP structure of the present invention includes a liquefied gelatinous material that forms a continuously contiguous transparent layer on the semiconductor image

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sense chip after drying up. Furthermore, a second embodiment shows a transparent glass plate which is also continuously contiguous. The glass plate has an area being equal to that of the semiconductor image sense chip and a thickness equal to that of each of the bumps. The unique concept of placing a continuously contiguous transparent layer on the top surface of the sense chip decreases the volume of the image sensor. Consequently, the manufacturing process of the smaller CSP is simplified and cheaper.

Conversely, the image sensor package of Glenn et al. shows an image sensor with a window mounted on the sensor by flip chip bumps. The window is not contiguous with the sensor. In fact, the window and image sensor define a cavity, column 6, lines 29-31. Furthermore, the cavity contains a medium between the window and the top of the sensor.

Thus, the cavity and medium that rest between the image sensor and window of Glenn et al, increases the volume of the sensor package and unnecessarily increases the manufacturing costs.

Moreover, Glenn et al.'s window does not have either an area equal to that of the image sensor or a thickness equal to that of each of the bumps, Figures 2-3. Furthermore, the process of utilizing a flip chip package with an image sensor, as shown by Glenn et al., limits the open sensing area of the image sensor as discussed on page 2, lines 3-10 of the Specification as filed.

Finally, the subject Patent Application teaches a periphery to the transparent

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layer covered by a shelter, which acts to prevent light from laterally penetrating into the CSP structure. The Examiner equated the bead (130) shown by Glenn, et al. to the shelter of the subject Patent Application. However, Glenn et al.'s bead merely acts to enhance the reliability of Glenn et al.'s image sensor package by preventing a failure of bumps being formed and the dismounting of the window, column 6, lines 23-25.

Thus, as Glenn et al. fails to disclose each and every element of the invention of the subject Patent Application, as now claimed, it is not believed to anticipate the invention. Further, as the reference fails to suggest a unique placement of elements and in fact fails to recognize the problems solved by the claimed invention, it does not make obvious the invention of the subject Patent Application.

The Park et al. reference does not overcome the deficiencies of Glenn et al. Park et al. discloses a package structure with a recess (11) of a U-shape formed in a semiconductor chip (10). An epoxy compound (50) is filled in the recess and used to set metal wires (40). The epoxy compound is not equivalent to the gelatinous material taught in the subject Patent Application. Alternatively, the epoxy serves to set metal wires and operates as a platform for a wafer and shows Yet, the gelatinous material discussed in the subject Patent Application is ground and burnished to form a transparent layer on the top face of the image sensor, that is continuously contiguous and permits light to pass through. Furthermore, the

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epoxy disclosed in the Park reference is not contiguous to the bottom surface of the recess of the cavity.

Thus, Park et al. fails to disclose a "...transparent layer being a single layer structure coated over a top surface of said sense chip in a continuously contiguous manner, said transparent layer for permitting light to pass therethrough having a thickness equal to a height of each of the conducting wire," as now defined in amended claim 1. In fact, like Glenn et al., Park et al. teaches away from the structure of the invention of the subject Patent Application, as now claimed.

As neither the Glenn, et al. nor Park, et al. reference when taken alone or in combination disclose or suggest the unique placement of elements that form the invention of the subject Patent Application, as now claimed, the combination does not make obvious the invention of the subject Patent Application as now claimed either under 35 U.S.C. § 102 and/or 35 U.S.C. § 103.

Thus, neither Glenn, et al. nor Park, et al. allude to, describe, or show either: "a transparent layer being a single layer structure coated over a top surface of said sense chip in a continuously contiguous manner, said transparent layer for permitting light to pass therethrough, having a thickness equal to a height of each of the conducting wire" or a "...transparent layer being a single layer structure coating a top surface of said sense chip in a continuously contiguous manner, said transparent layer for permitting light to pass therethrough," as is necessary for the purposes and objectives of the Applicant as now defined in the amended

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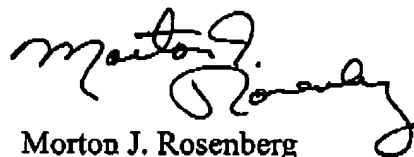
Independent Claims 1 and 5.

It is respectfully submitted that neither Glenn et al. nor Park et al. show the transparent layer "being continuously contiguous to the top of the image sense chip" which is now clearly defined in the amended Claims.

Thus, it is believed that independent Claims 1 and 5 recite combinations of elements that are both novel and non-obvious over the cited reference and consequently believed to be in condition for allowance. That being so it is also believed that Dependent Claims 2-5 and 6-10 are allowable for at least the same reasons for which the claims in which they are based are allowable.

In view of the foregoing amendments and remarks, Applicant believes that the subject Patent Application is now in condition for allowance and such action is respectfully requested.

Respectfully submitted,  
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